

Cruise Report

Canyons, Vents, and Seeps of the Chile Margin

R/V Falor (too)

FKt241011



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Newport, Oregon

NOAA Pacific Marine Environmental Lab & NOAA Ocean Exploration Partnership

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2. Cruise overview

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Cruise: FKt241011 (RV Falkor (too))

Study site: Offshore Chile Margin

Goals and Sampling Objectives - The primary goal of the R/V *Falkor (too)* expedition along the Chilean margin was to investigate deep-sea methane seep systems and their interactions with tectonic, climatic, and oceanographic processes. This research aimed to map and characterize methane seeps using advanced technologies such as multibeam sonar, high-resolution sub-bottom profiling, and remotely operated vehicle (ROV) surveys. The expedition sought to understand the spatial distribution and dynamics of methane emissions, fluid migration pathways, and their influence on seafloor ecosystems. By deploying sediment cores and in situ geochemical sensors, including the SAGE methane sensor, the team collected critical data to reconstruct seepage history and assess its impact on global carbon cycling. The findings from this mission will inform future studies, conservation efforts, and predictive models for methane behavior under shifting environmental conditions.

Synopsis: From October 11 to December 5, 2024, the R/V *Falkor (too)* embarked on an ambitious expedition to explore the unique geological and biological systems of the Chilean margin. Supported by NOAA Ocean Exploration, this research focused on methane seepage—a significant contributor to oceanic carbon cycling—and its interaction with tectonic, climatic, and oceanographic processes. This work, conducted in collaboration with an interdisciplinary team of scientists from multiple countries, aimed to unravel the complexities of methane seep systems in this tectonically active region.

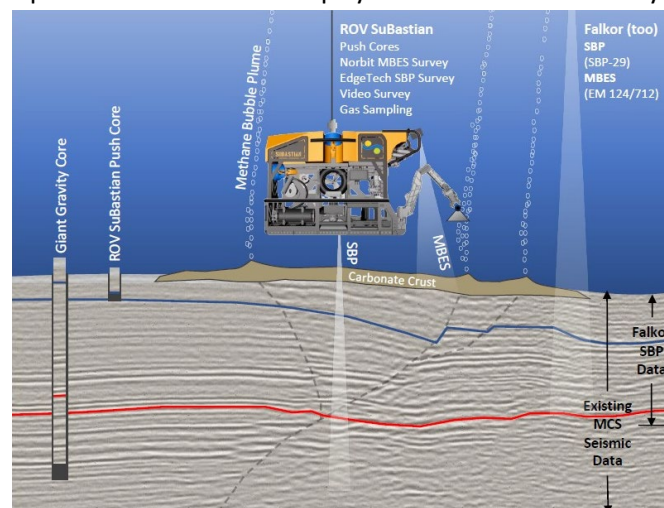
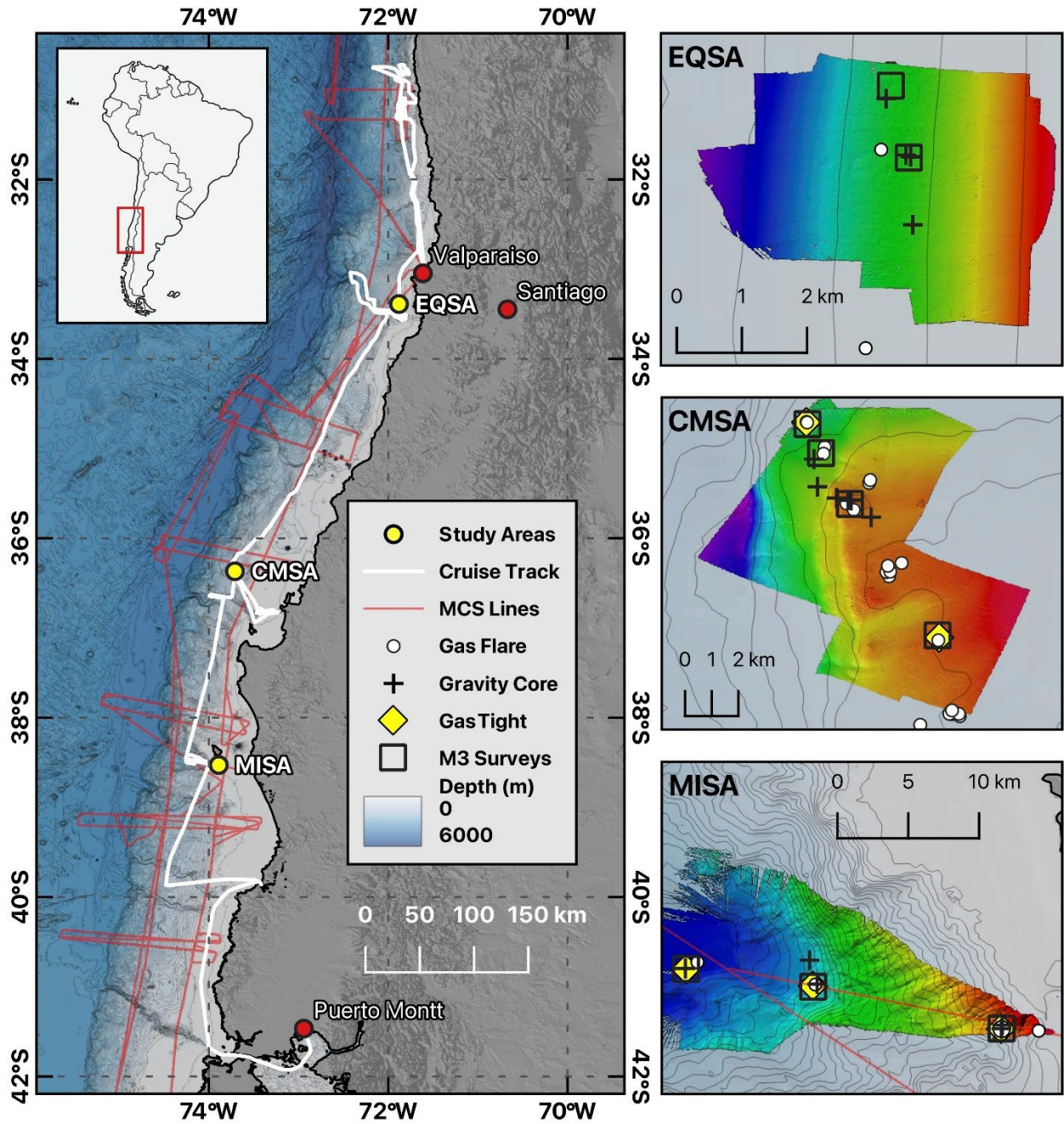


Figure 1: Cartoon schematic of sampling/exploration plan for ROV Subastian

Figure 2: Map showing the coverage and areas of seep exploration and characterization.



3. Description of operations

Research / Exploration Team Members

- **Jeffrey Beeson:** Co-Principal Investigator specializing in MBES (multibeam echosounder) and geology, Jeffrey Beeson contributed to high-resolution seafloor mapping and geological analyses during the expedition. His expertise ensured precise identification of seep locations and structural features along the Chilean margin.
- **Anson Antriasian:** managed gas-tight sampling operations, which were critical for preserving the integrity of gas samples collected at methane seep sites. His role supported geochemical investigations into methane fluxes and emissions.
- **Davide Oppo:** Co-Principal Investigator focusing on coring and geology, Davide Oppo oversaw sediment coring operations to reconstruct methane seepage history. His leadership ensured the collection of comprehensive sedimentary records from active seep sites.
- **Adam Skarke:** Co-Principal Investigator, led MBES operations and geological surveys to map seafloor features and seep habitats. His research supports understanding the geological processes influencing seep dynamics.
- **Jeffrey Marlow:** Serving as the Chief Scientist onshore, Jeffrey Marlow coordinated the onshore team and integrated scientific findings from the expedition. His work bridges marine research with broader ecological and biogeochemical studies.
- **Gracie Babineaux:** A Ph.D. student specializing in coring and sampling, Gracie Babineaux focused on sediment sample collection and analysis. Her contributions aided investigations into methane seep ecosystems and biogeochemical cycling.
- **Miles Harbury:** Ph.D. student involved in coring and sampling.

Daily Summary of Vessel Activities - FKt241011 Expedition

October 11, 2024 - Departure & Initial Measurements

- The expedition departed from Valparaíso, Chile at 10:00 AM.
- Underway meteorological, seawater, and acoustic measurements were conducted during transit to Limari Seep.

October 12-13, 2024 - Limari Seep Operations

- Arrival at Limari Seep (~1000 m depth).
- Ship-based mapping (EM & SBP) conducted.
- Argofloat deployment at designated site.
- Conducted CTD 1.1, SBP mapping, and ROV troubleshooting.

October 14, 2024 - Transit to El Quisco

- Full-day transit from Limari Seep to El Quisco Seep.

October 15-17, 2024 - El Quisco Seep Operations

- Ship-based mapping and ROV Dive 726 completed.
- Conducted gravity core dry run and collected CTD 2.1 (background).
- ROV Dive 727 completed, along with multiple gravity cores and Bongo net sampling.

- ROV Dive 729 at the northern seep zone.

October 17-18, 2024 - Final Dives & Transit to San Antonio

- ROV Dive 730 at the middle seep zone.
- Transit from El Quisco to San Antonio Canyon.

October 18-21, 2024 - San Antonio Canyon Operations

- ROV Dive 731, followed by shipboard mapping.
- ROV Dive 732 and CTD deployments.
- ROV Dive 733 focused on BBC crabs.
- Additional canyon mapping and Bongo net deployments.

October 21-22, 2024 - Transit to Concepción Seep

- Full-day transit to Concepción Seep.

October 22-25, 2024 - Concepción Seep Operations

- ROV Dives 735-739 at depths between 700-927 m.
- Conducted CTD, gravity coring, and Bongo net sampling.
- ROV Dive 737 stopped early for maintenance.

October 25-30, 2024 - Bio Bio Canyon & Transit to Mocha Island

- ROV Dive 740, mapping, and CTD deployments.
- Transit from Bio Bio Canyon to Mocha Island Seeps.

October 30 - November 3, 2024 - Mocha Island Seeps Operations

- Ship-based mapping at ~1000 m depth.
- ROV Dives 744-747 conducted.
- Gravity coring, CTD, and Bongo net sampling.
- November 3: Transit to Puerto Montt begins.

Cruise Highlights – FKt241011 Expedition

The FKt241011 expedition along the central Chilean margin delivered an extraordinary series of scientific, geological, and outreach achievements. Over 23 ROV dives (S0725–S0747), the team explored methane seeps, submarine canyons, and deep-basin environments ranging from 400 to nearly 2800 meters in depth. Below is a curated list of the most exciting discoveries and moments from the expedition.

Biological Highlights

- **Humboldt Squid Strikes the ROV**
During Dive S0727, an aggressive Humboldt squid attacked the ROV manipulator while surveying a tubeworm bush—one of the most dynamic predator-prey interactions captured on video.
- **Brooding Octopus Observed in a Seep Cavity**
In Dive S0739, a female octopus was found guarding her eggs inside a carbonate crevice—a rare behavioral observation at a methane seep.

- **Swarming Amphipods at Hydrate Vents**
Dive S0745 documented clouds of amphipods, including the distinctive “praying mantis” variety, surrounding shimmering gas hydrates near 2774 m depth.
- **Massive Tubeworm and Clam Colonies**
Across multiple seep sites (S0726, S0736, S0744), the team encountered sprawling biological communities with thick tubeworm bushes, clams, and microbial mats.
- **Orange and Black Microbial Mats**
Dive S0746 revealed strange orange amorphous mats alongside black bacterial carpets, expanding the palette of known seep mat diversity.

Geological Observations

- **Carbonate Ridges and Terraces**
El Quisco and Concepción sites revealed extensive authigenic carbonate structures hosting seep fauna and recording long-term fluid flow.
- **Gas Hydrate Outcrops**
At Mocha Island (S0744, S0745), the team visually confirmed active hydrate patches venting bubbles and supporting dense microbial life.
- **Vertical Canyon Walls with Coral and Sponge Habitats**
Steep walls in San Antonio and Bio Bio Canyons (S0732, S0741) displayed dramatic stratigraphy and rich vertical biological zonation.
- **Slope Instabilities and Mass Wasting**
Geologic observations revealed slumping, scarps, and turbidity-related sediment transport processes throughout the canyons.

Sampling and Sensors

- **Record-Breaking Sampling Dives**
Dive S0736 resulted in 103 total samples—the highest of the cruise—spanning fauna, fluids, microbial mats, and cores.
- **M3 Sonar and CH₄ Sensor Synergy**
Acoustic bubble detection and methane mapping led directly to new seep discoveries at Concepción and Mocha Island.
- **Seep Zone Expansion**
Newly confirmed active seeps (e.g., S0742, S0746) extended the known footprint of methane emissions along the Chilean margin.

Together, these highlights illustrate the FKt241011 expedition’s success in advancing our understanding of deep-sea methane seeps, canyon ecosystems, and Chilean margin biodiversity.

Summary of each day, dive, or deployment

Dive-by-Dive Narrative:

ROV *SuBastian* Operations

This report specifically covers **Leg 1** of the FKt241011 expedition, as it was the only component funded and supported by NOAA Ocean Exploration.

The research team aimed to collect push cores, gravity cores, biological samples, gas samples, CTDs, and Bongo Nets at each dive location. NOAA Ocean Exploration-funded investigators specifically focused on sediment push cores, gas samples from actively bubbling sites, gravity cores, and multi-cores. Notably, gas and gravity cores were only collected at locations where seepage was observed.

Limarí Canyon (Dives S0723-S0725)

The expedition began with a series of exploratory dives in the Limarí Canyon, a previously uncharacterized submarine canyon system. The first two dives (S0723, S0724) were aborted due to ROV mechanical issues, preventing initial site assessments. Despite these setbacks, dive S0725 successfully reached a maximum depth of **1617.66 meters**. However, no evidence of methane seepage was observed at Limarí Canyon.

El Quisco Seep Area (Dives S0726-S0731)

A major focus of the expedition was the El Quisco Seep Area, known for its active methane emissions. Dive S0726 was the most productive in this region, reaching a depth of **419.33 meters**. Subsequent dives (S0727-S0731) focused on extending the spatial coverage of seep sites, characterizing microbial mats, carbonate formations, and the geochemistry of escaping fluids. High-resolution multibeam mapping with the **Kongsberg M3 system** was deployed at each seep site, helping to pinpoint areas of concentrated seepage.

- **Dive S0727:** Initial mapping with the M3 system and confirmation of the SAGE CH₄ sensor operation. The dive included low-altitude passes to search for seepage and biological interactions, leading to the characterization of habitat types and associated fauna.
- **Dive S0729:** Explored the northern extension of El Quisco, focusing on a previously unvisited area with suspected carbonate formations and seep-associated ecosystems.
- **Dive S0730:** Dedicated dive for BBC Blue Planet III footage, using the M3 system to capture high-resolution imagery of seep-associated life and succession processes.

San Antonio Canyon (Dives S0732-S0734)

Moving southward, dives in the San Antonio Canyon investigated the interaction between submarine canyon systems and fluid seepage. The deepest dive in this region, S0734, reached an impressive **2257.15 meters**. These dives provided critical insights into the geological controls on methane migration, including faulted canyon walls with active seepage zones.

- **Dive S0732:** Focused on coring, biological sampling, and habitat mapping along the canyon axis and walls.

- **Dive S0734:** A follow-up to Dive S0732, further exploring the canyon's stratigraphy and seep-associated ecosystems.

Concepción Methane Seep Area (Dives S0735-S0739)

- **Dive S0737:** This dive revisited previously mapped seep sites to document methane bubbling activity and assess habitat variability. The dive targeted areas of active seepage and microbial mat coverage, utilizing push cores to collect sediment samples for geochemical analysis.
- **Dive S0738:** Focused on high-resolution imaging of carbonate formations and bacterial mats. The ROV collected several biological samples, capturing key seep-associated organisms to study their adaptations to methane-rich environments.
- **Dive S0739:** Expanded the spatial survey of seep fields, employing gas-tight samplers to capture methane bubbles directly from active seeps. This dive also recorded evidence of deep-sea faunal interactions with the seep environment.

The Concepción Methane Seep Area (CMSA) was a key site for methane flux measurements. The in situ **SAGE methane sensor** was deployed to quantify methane concentrations directly from the water column, revealing highly variable seep intensities across different sites. Dive S0736 was particularly successful, collecting data from actively bubbling seepage zones.

Mocha Island Seeps (Dives S0744-S0747)

- **Dive S0740:** Explored the western extent of the Mocha Island seep field, mapping carbonate outcrops and deep-sea mussel beds. The dive included water sampling using CTD rosettes to measure methane and other dissolved gases.
- **Dive S0741:** Focused on vertical seepage structures, identifying gas plumes and associated microbial mats along a fault-controlled seep system. The ROV used the M3 multibeam sonar to map seep distribution.
- **Dive S0742:** Investigated a transition zone between seep and non-seep habitats, collecting sediment cores to analyze microbial community variations and geochemical gradients.
- **Dive S0743:** Conducted targeted sampling of a high-density seep area, retrieving gas samples and push cores to evaluate methane flux rates.
- **Dive S0744:** Surveyed the deep-water Mocha Island seep sites, capturing high-definition video of extensive carbonate formations and chemosynthetic life.
- **Dive S0745:** The deepest dive of the expedition, reaching **2774.35 meters**, revealing an expansive field of methane seeps. The team collected multiple sediment cores and in situ methane sensor readings to quantify seep activity.
- **Dive S0746:** Explored a shallower seep location, completing a transect to link deep and shallow seep systems, furthering our understanding of seep connectivity and ecological zonation.

The final dives of the expedition targeted the Mocha Island Seep Area, with a focus on deep and shallow seep fields. Dive S0745 was the **deepest of the entire leg 1 expedition**, reaching **2774.35 meters**. This site revealed extensive carbonate deposits and thriving chemosynthetic

communities, reinforcing the significance of methane seepage in structuring deep-sea habitats. The final dive, S0747, explored a shallower seep site at **478.61 meters**, completing the survey of methane seepage in the Mocha Island region.

ROV Dive Summaries

Dive S0726 – El Quisco Seep

Biological:

This dive yielded some of the most striking biological observations of the expedition's early phase. Key faunal highlights included dense *Lamellibrachia* tubeworm bushes, thick bacterial mats, clam beds, and various crustaceans including galatheid crabs and shrimps. Notably, a pair of squid were observed interacting—possibly displaying mating behavior—and a large shark was seen briefly on camera. Several octopus sightings were also recorded, including one interacting with tubeworms. The biological community composition and distribution strongly indicated active seepage with chemosynthetic primary production. The team also remarked on multiple holothurians and a high abundance of brittle stars in soft sediment areas. Seafloor litter, such as bottles and marine debris, was present and noted for potential ecological impact.

Geological:

The dive area featured a mixture of soft sediments interspersed with authigenic carbonate outcrops, especially in areas coinciding with seep activity. The carbonate was often colonized by sessile fauna and provided habitat structure for tubeworm colonies. Some portions of the seafloor showed signs of gas release and minor pockmarking, likely related to underlying fluid flow pathways. The terrain was relatively flat to gently sloping, with isolated rock mounds and sediment fans. Video and verbal commentary identified irregular seafloor reflectivity changes and possible bioturbation zones associated with seep-related activity.

Mapping:

Although no M3 multibeam mapping was conducted during the dive itself, the site had been mapped extensively using the ship's EM302 and CHIRP systems prior to ROV deployment. These data informed the dive plan, which targeted previously identified acoustic anomalies consistent with gas seepage. Methane sensors (CH₄) were deployed during the dive to correlate with visual observations of seep-associated fauna. While the sonar systems were not actively used during this ROV dive, the team referenced prior bathymetric and backscatter datasets frequently during navigation and targeting.

Operations:

S0726 marked the first biologically intensive ROV dive of the cruise. The team executed 99 sampling events—an exceptionally high number—including push cores, biological collections (clam, tubeworms, mat, crab), and video transects. The dive was tightly timed, as it followed up on seep targets identified during the night mapping shift. Operations included coordination with methane sensor deployment and on-the-fly adjustments to accommodate the presence of dense biological assemblages and complex terrain. Communication among the science team was active

and dynamic, especially during periods of high biological interest. ROV navigation and sampling remained efficient despite the large number of collection events and complex habitats.

Dive S0727 – El Quisco Seep

Biological:

This dive captured some of the highest faunal density seen on the El Quisco seep sites. The ROV encountered expansive fields of tubeworms (*Lamellibrachia* spp.), microbial mats ranging from bright white to mottled orange, dense clam beds, and galatheid crabs. Notably, one of the most memorable biological moments involved a large Humboldt squid making repeated strikes at the ROV manipulator and arm, likely reacting to the lights or movement. Fish, including rattails and rockfish, were frequently observed hovering above and within seep habitats. Several octopods were seen camouflaging against carbonate substrates, and anemones populated hard surfaces throughout the site. Predatory and scavenging behaviors were documented in real time and commented on in the ROV audio log. Biofilms and fine filaments coated rocks near active bubble venting.

Geological:

The dive site was structured across a moderately sloped seafloor, punctuated by carbonate platforms and blocky outcrops associated with long-term methane seepage. Several pitted depressions were noted in sedimented areas, possibly formed by gas escape or bioturbation. The ROV also imaged sharp contacts between hard and soft substrates, which seemed to correlate with faunal transitions. Authigenic carbonates were heavily encrusted with fauna and sediment, forming ledges and flanges. Scattered clasts and slope-parallel rock ridges may indicate past collapse or brecciation events.

Mapping:

This dive built directly on the results of Dive S0726 and extended the visual coverage across new seep mounds detected acoustically. While no active sonar mapping was performed during the dive, methane targets from CH₄ sensors and bubble plumes observed in M3 sonar helped define the track. The dive provided high-resolution video and photo mapping of seep-associated structures, used to update the GIS products and habitat classification.

Operations:

A total of 93 samples were collected, including push cores, biological grabs, and gas samples. Sampling focused on seep fauna, bacterial mats, and sediment immediately adjacent to bubble streams. Midway through the dive, the team responded to a brief interaction with an aggressive squid by repositioning the vehicle and continuing transects upslope. Precise navigation and pilot-scientist coordination allowed sampling in tight spaces between carbonate blocks. Outreach moments were integrated into operations, including real-time natural history commentary and species identification. Despite occasional surge and visibility changes, the dive remained well-paced and data-rich.

Dive S0729 – El Quisco North

Biological:

Dive S0729 revealed a rich biological community consistent with active methane seepage. Notable species included extensive tubeworm colonies, microbial mats (white, orange, and mottled), clam beds, squat lobsters, brittle stars, and galatheid crabs. Several octopuses were observed camouflaging against carbonate outcrops and engaged in hunting or hiding behaviors. A shark egg case was seen affixed to a rocky ledge—an indicator of nursery habitat value. Fish including rockfish and small rattails were seen hovering in the water column or darting between crevices. Brittle stars were especially abundant in coral-covered areas, often forming dense carpets. The dive team noted a high density of small crustaceans and polychaetes in sedimented patches between seep structures. Bioturbation was evident throughout the site.

Geological:

The dive track covered a region dominated by pockmark depressions and carbonate-encrusted mounds. Several authigenic carbonate platforms were documented, surrounded by softer hemipelagic sediments. The terrain alternated between ridged structures and subtle basin-like features that may reflect focused fluid flow. Some carbonate blocks showed signs of fracturing or collapse, and bacterial mats often coated these surfaces. The geology displayed high heterogeneity over short distances, influencing the distribution of biological communities. Carbonate platforms provided anchor points for sessile fauna and helped stabilize localized seep ecosystems.

Mapping:

This was the first ROV dive conducted in the northern extent of the El Quisco seep field. Prior M3 sonar data and CH₄ sensor surveys had identified this area as a target for seep activity. While no active sonar mapping was done during the dive itself, the ROV was guided based on previously acquired acoustic targets. The dive helped refine the interpretation of pockmark features seen in multibeam bathymetry, particularly by validating the presence of chemosynthetic communities and bubble streams at specific depressions.

Operations:

A total of 79 samples were collected, including push cores, fauna, carbonate rocks, and fluid samples. The ROV team executed multiple transects across seep zones, alternating between close-up visual surveys and sampling at strategic intervals. The dive featured coordinated science operations, including methane plume ground-truthing and mid-dive sampling strategy adjustments based on real-time observations. Navigation relied on USBL positioning, and the ROV successfully operated in moderately sloped terrain with intermittent currents. Communications among the science team and pilot were essential during repositioning maneuvers around steep carbonate blocks. No equipment failures were reported, and dive objectives were fully met.

Dive S0730 – El Quisco (BBC Filming Dive – Detailed Summary)

Biological:

The dive revisited previously documented seep habitats to visually capture the biodiversity and behavior of seep-associated organisms for natural history storytelling. Key fauna included dense tubeworm clumps, white and orange microbial mats, clams, galatheid crabs, and rockfish. The team observed interactions among species, including predatory behaviors and scavenging, with a focus on showcasing succession stages in seep development. Octopuses were seen in crevices and near carbonate blocks, while small fish moved in and out of frame frequently. Close-up footage was obtained of clams partially buried in soft sediment, tubeworm plumes swaying in fluid flow, and mats covering carbonate ledges. The dive emphasized visual coverage of these communities rather than biological novelty.

Geological:

Geological features included extensive carbonate platforms, sedimented slopes, and seep-associated mounds. The terrain consisted of a combination of authigenic carbonates and pitted depressions, likely due to gas migration pathways. Sediment texture varied between soft muds in flat areas and gravelly patches near carbonate blocks. These features served as dramatic backdrops for BBC filming sequences and helped contextualize biological observations. Bacterial mats were often found at the contact between hard and soft substrates, highlighting the geological controls on seep habitats.

Mapping:

This dive did not include any active sonar mapping, as its primary goal was to support visual media production. However, the trackline was designed to revisit previously mapped features from Dives S0726 and S0727, which had been identified as hotspots for biological activity and visual interest. The pilot and science team coordinated to ensure the ROV maintained consistent altitude and framing for optimal videography. The dive effectively contributed to ground-truthing acoustic anomalies with high-resolution imagery.

Operations:

Dive S0730 was conducted in close collaboration with the BBC Natural History Unit for the production of *Blue Planet III*. No samples were collected during this dive; all efforts were focused on obtaining high-quality footage of seep communities and associated fauna. ROV navigation prioritized smooth, slow movements, with careful lighting and camera positioning. The team revisited several key features multiple times to accommodate different filming angles and lighting conditions. Communication was streamlined between the ROV pilots, science leads, and the media team to coordinate on-the-fly decisions about subject framing, duration of hold shots, and scene transitions. Despite the absence of sampling, the dive was a major success in outreach and media production, showcasing the expedition's scientific targets to a global audience.

Dive S0731 – El Quisco North Extension (Detailed Summary)

Biological:

Dive S0731 explored the northern extension of the El Quisco seep field and revealed one of the most biodiverse assemblages of the expedition thus far. Dense coral bioherms hosted communities of squat lobsters, brittle stars, anemones, and small schooling fish. Multiple octopuses were seen using rocky ledges for shelter, while shrimp and small crabs occupied mat-lined carbonate terraces. Galatheid crabs were especially prominent. Highlights included a large squid ambushing prey in the foreground of the ROV's camera view. Bioturbation was evident throughout sedimented basins, and microbial mats—mostly white and filamentous—lined the carbonate rock bases. Tubeworm clusters were observed both on vertical slopes and flat patches.

Geological:

The dive traversed steeply inclined mounds, vertical ledges, and interspersed sediment ponds. Large carbonate blocks formed terraces and ledges that often served as faunal aggregation points. Pockmarked sediment and boulder fields suggested localized gas migration zones, with strong seepage indicated by associated mat development. Stratification in some rock faces hinted at layered seep deposition or erosion history. The geology reflected a transitional zone between active seep mounds and deeper canyon-like terrain.

Mapping:

While this dive did not perform new sonar mapping, it was guided by targets identified in earlier M3 sonar passes and shipboard multibeam data. The dive provided key high-resolution video ground-truthing for acoustic anomalies and extended spatial understanding of the seep system's northern margin. Areas visited in this dive filled gaps between previous dive sites and helped refine feature connectivity.

Operations:

Sampling totaled 85 items and included push cores, carbonate chips, biological grabs, and targeted fauna collections. The ROV maintained safe altitude while traversing high-relief carbonate outcrops. Squid interactions required brief repositioning and pilot reorientation. Coordinated effort between the science team and ROV pilots ensured high-quality imaging and precise sample handling. Navigation relied on USBL and onboard DVL for accurate tracking in complex terrain. The dive successfully advanced both the spatial scope and biological inventory of the El Quisco system.

Dive S0732 – San Antonio Canyon (Detailed Summary)

Biological:

Dive S0732 documented a biologically diverse canyon wall environment. Sessile invertebrates such as octocorals, sponges, and actinarians dominated vertical rock faces, often forming dense, layered communities. Crabs were frequently observed perched on ledges or foraging near coral branches. Holothurians and sea cucumbers occupied sedimented terraces, while occasional rattail and other deep-sea fish moved slowly along the canyon axis. The team noted several pelagic organisms in the water column near vertical structures. Faunal density was highest on vertical surfaces with minimal sedimentation, and diversity shifted with changes in slope and depth.

Geological:

This dive provided a detailed look at the geological structure of San Antonio Canyon. Vertical exposures of stratified sedimentary rock alternated with slumped debris fans and sedimented gullies. Several large blocks and ledges showed evidence of mass wasting or rotational sliding. The canyon wall was characterized by high relief and discontinuous terraces, some partially buried in fine-grained sediment. Evidence of erosion and sediment transport was widespread. No authigenic carbonates or seep-associated mineralization were observed, suggesting the canyon was a non-chemosynthetic, sediment-dominated environment.

Mapping:

Although no sonar mapping was performed during the dive, navigation was guided by detailed EM302 multibeam bathymetry collected during the transit. The dive track was selected to follow a near-vertical wall feature extending downslope from a mapped notch. ROV video data helped refine interpretations of slope morphology and sediment transport pathways. Imagery from this dive provided an important contrast to the seep-associated mapping conducted earlier in the expedition.

Operations:

The ROV conducted long lateral and vertical transects, adjusting altitude frequently to maintain distance from sheer walls. Sampling totaled 84 collections, including push cores from sediment benches, biological grabs from coral and sponge assemblages, and targeted Niskin deployments. Pilots exercised precision control to maneuver within meters of vertical rock faces, occasionally adjusting position due to lateral currents. Science team coordination was essential to ensure representative sampling across biological zones and substrate types. Despite technical challenges posed by steep terrain, the dive achieved its scientific goals of canyon wall characterization.

Dive S0734 – San Antonio Canyon (Deep Section – Detailed Summary)

Biological:

Dive S0734 extended previous observations into the deeper reaches of San Antonio Canyon, reaching depths over 2250 meters. Fauna were sparsely distributed but included key deep-sea species such as holothurians, large actinarians, and solitary octocorals. Occasional sightings of rattails and other demersal fish were made near sedimented flats. Benthic invertebrates, including sea cucumbers and brittle stars, were more common along low-relief slope breaks. Sessile filter feeders were patchily distributed on exposed rocky outcrops. While biodiversity was lower than at shallower seep or canyon wall sites, the dive provided valuable data on deep benthic community composition in a non-seep canyon setting.

Geological:

The dive traversed a long, gently sloped sediment fan leading into a deeper channelized axis. Fine-grained sediments dominated the seafloor, with intermittent hardground and occasional scattered rock fragments. Evidence of downslope transport included ripple structures, soft sediment waves, and debris trails. Occasional ledges and breaks in slope suggested intermittent mass-wasting processes. No carbonates or seep-related geologic features were identified, confirming the absence of methane-derived habitat modification. The geological record captured here helped build a canyon-to-abyssal plain transition profile.

Mapping:

While the ROV dive itself did not use M3 or DVL mapping modes, it was guided by multibeam bathymetry that revealed slope gradients and feature boundaries. This dive helped to ground-truth bathymetric interpretations of deep canyon topography and assess sediment distribution patterns. The visual record added context to regional maps used in habitat modeling.

Operations:

ROV operations were focused on long-distance transecting across a gradually sloping seafloor, with intermittent sampling stops based on substrate changes and faunal presence. A total of 75 samples were collected, including push cores from the soft seafloor, biological specimens, and limited rock grabs. The deep nature of the dive presented challenges in terms of lighting and navigation, with occasional repositioning needed to regain tracklines. Pilots maintained smooth trajectories while the science team directed sampling strategy from live observations. Overall, the dive offered a successful extension of the canyon survey into its deepest sections.

Dive S0735 – Concepción Seep (Detailed Summary)

Biological:

Dive S0735 marked the return to the well-known Concepción Seep, first explored in 2010. The dive revealed thriving chemosynthetic communities including dense tubeworm bushes (*Lamellibrachia* spp.), clam beds, and microbial mats of varying textures and colors. Clusters of shrimp and galatheid crabs were common on carbonate surfaces, and small fish, including zoarcids and rockfish, hovered over seep mounds. Octopuses and anemones occupied crevices among carbonate blocks, while holothurians moved slowly across adjacent sediments. Faunal density and distribution reflected zones of active seepage, with more mobile fauna congregating near bubble sites. Several observations suggested layering in community development, from microbial mats to mature fauna.

Geological:

The dive traversed a moderately sloping seep field with carbonate outcrops, layered sediment pockets, and active venting features. Carbonate rocks formed ledges and small terraces that served as focal points for faunal colonization. Authigenic carbonates and associated bacterial mats lined bubble streams, with white filamentous mats often outlining fissures and fractures. The seafloor morphology featured small ridges and depressions, consistent with fluid flow and seep evolution. No collapse pits or large-scale pockmarks were noted, suggesting stable and mature seepage conditions.

Mapping:

No active sonar mapping was performed during the dive, but the site had been mapped acoustically during the 2010 expedition and in the lead-up to this dive using CH₄ sensors and multibeam bathymetry. These data guided ROV positioning and sampling targets. The ROV observations helped validate seep locations and provided detailed visual data to update existing maps.

Operations:

The dive yielded 40 samples, including push cores from mat-covered sediments, clam and tubeworm specimens, and carbonate crusts. Operational focus was on biological and fluid sampling, coordinated with the shipboard methane sensor team. The ROV maintained moderate altitude and conducted slow passes to allow for detailed imaging. Lighting and visibility were excellent, allowing the science team to request targeted sampling with high precision. The revisit of this classic seep site provided a valuable benchmark for evaluating seep stability and faunal succession over time.

Dive S0736 – Concepción Seep (Extended Mapping and Sampling – Detailed Summary)

Biological:

Dive S0736 showcased one of the most biodiverse and expansive seep habitats observed during the expedition. Extensive coral mounds—some over a meter tall—served as the structural foundation for complex faunal assemblages, including *Lamellibrachia* tubeworm bushes, clams, microbial mats, squat lobsters, galatheid crabs, and numerous species of shrimp. Fish diversity was high, with zoarcids, rattails, and rockfish all observed around seep structures. Octopuses were present in carbonate crevices and soft sediment zones, while anemones and sponges colonized both carbonate ledges and sediment patches. The team observed gradients in faunal composition and community maturity that appeared to correlate with seep fluid strength and substrate type. Black bacterial mats, typically found in more active zones, were also present.

Geological:

The dive area consisted of sloped carbonate ridges, sediment drapes, and exposed vent openings. Carbonate crusts were thick and often coated with mats or shelled fauna. The terrain was more expansive and vertically complex than previous Concepción dives, suggesting it may represent a long-lived seep environment. Sharp sediment-to-carbonate transitions indicated stable seep pathways. No collapse features were observed, though some lateral scarping and irregular slope angles suggested slow geological modification.

Mapping:

While no new sonar mapping occurred during the dive, S0736 was designed to expand the spatial bounds of previously known seep areas. Visual coverage extended beyond the dive tracks of S0735 and earlier CH₄ sensor transects. Observations helped fill spatial gaps in biological and geological mapping, and numerous new targets were visually confirmed.

Operations:

Sampling effort was high, with 103 total collections made—including fauna, microbial mats, fluids, push cores, and rock samples. The ROV maneuvered across broad terrain with varied slope, frequently adjusting altitude to maintain optimal imaging and sampling conditions. Coordination between the science team and pilots ensured efficient collection and documentation of new features. The dive represented a high water mark for sampling intensity, visual coverage, and biodiversity within the Concepción seep system. Real-time dialogue throughout the dive reflected excitement over habitat richness and new discoveries.

Dive S0737 – Concepción Seep (BBC Filming and Light Sampling – Detailed Summary)

Biological:

Dive S0737 revisited previously surveyed portions of the Concepción Seep field with an emphasis on capturing high-quality video footage for BBC documentation. Despite a lighter sampling load, the dive revealed vibrant communities of tubeworms, clams, microbial mats, galatheid crabs, and zoarcid fish. Several octopuses were observed taking refuge in carbonate crevices. Bacterial mats of varying thickness and color (mostly white and tan) covered carbonate crusts and sediment patches. Shrimp swarms and occasional small fish hovered around venting areas, and brittle stars were observed among faunal clumps. The faunal distribution matched patterns seen on earlier dives at this site, with seep indicators clearly tied to active vent zones.

Geological:

The site was dominated by carbonate-encrusted mounds, slabby crusts, and soft sediment plains. Areas with exposed carbonate tended to coincide with dense faunal assemblages. The dive track followed natural ridges and terraces likely formed through episodic fluid flow and carbonate precipitation. No major new geological structures were discovered, but the revisit allowed for high-definition documentation of small-scale geologic features such as fissures, seep apertures, and sediment texture variations.

Mapping:

No M3 sonar mapping was conducted during this dive, but it benefited from existing bathymetric and CH₄ sensor datasets that guided its trackline. The ROV focused on known features to allow repeat video documentation and positioning of camera angles for BBC footage. Bubble detection during prior mapping helped align visual observations with known seep points.

Operations:

This dive was jointly optimized for science and outreach. While it resulted in only 14 collected samples (including microbial mats and fauna), operational priorities focused on capturing dynamic, clear video segments of seep habitats. The ROV team maintained consistent altitude and slow flyovers, with pilots coordinating closely with BBC videographers and science observers. Key scenes were re-approached for angle or lighting corrections. Navigation emphasized smooth, sweeping arcs to enable cinematic sequences. Despite the minimal sample collection, the dive was highly productive in capturing natural behaviors, community context, and broader visual storytelling of a mature seep environment.

Dive S0738 – Concepción Seep (Revisit for Outreach – Detailed Summary)

Biological:

This dive focused on re-documenting key biological targets within the Concepción Seep area for continued BBC filming, while also capturing supplementary scientific observations. The team encountered large mats of white and tan microbial growth, scattered tubeworm aggregations, clams embedded in seep sediment, and anemones occupying both hard and soft substrates. A notable moment included an octopus perched among carbonate ledges, displaying camouflaging behavior. Several fish, including small rockfish and rattails, moved throughout the frame during filming sequences. Shrimp swarms were common around bubble vents, and brittle stars were seen in sediment pockets and among shell hash. The faunal composition echoed earlier dives, with distribution again tied closely to seep fluid pathways and carbonate exposure.

Geological:

The seafloor consisted of sloped carbonate mounds, flanking soft sediment depressions, and scattered rubble. Carbonate crusts displayed vertical relief and overhangs, offering habitat to multiple taxa. The team noted fissures with visible bubble release and filamentous mat accumulation—indicators of active seepage. Sediment transitions and erosional features were occasionally visible in video, suggesting long-term fluid flow shaping the microtopography.

Mapping:

As with other outreach-focused dives, no new sonar mapping was conducted. However, the dive benefited from detailed bathymetric maps and gas sensor data used to locate high-interest features. Pilots navigated among previously identified seep sites to re-document key structures, ensuring consistency with prior dive tracks (notably S0735 and S0737).

Operations:

Although the sampling load was light (24 samples), operations were successful in both scientific and media contexts. Sampling focused on microbial mats, selected fauna, and sediment near bubble streams. The ROV maintained low, stable flight paths to allow for sweeping visual documentation. BBC videographers directed some aspects of camera work, with support from the ROV team and scientists onboard. Lighting and visibility remained excellent throughout the dive. Coordination between outreach and science ensured coverage of high-value targets and allowed flexible, responsive adjustments based on in situ observations.

Dive S0739 – Concepción Seep Site III (Detailed Summary)

Biological:

Dive S0739 explored a new region of the Concepción margin, revealing diverse and dynamic seep communities. The site was characterized by rich assemblages of tubeworms, clams, microbial mats, and multiple species of fish, crabs, and shrimp. A particularly memorable moment was the observation of a brooding octopus guarding its egg mass in a rocky cavity—an indication of critical habitat function. Coral fields interspersed with mats hosted squat lobsters and brittle stars. Fish, including rattails and rockfish, patrolled the area, and swarms of shrimp were seen near bubble streams. Some microbial mats were described as thick, filamentous, and distinctly colored (white and yellow), coating both sediment and carbonate surfaces.

Geological:

The dive area featured pockmarked seafloor and localized carbonate platforms that supported dense biological assemblages. Carbonate crusts were often fractured or uplifted, and bubble emissions emerged from crevices at multiple locations. The terrain was variable, with scattered boulders, ledges, and flat sediment patches. The team noted a relatively recent mound structure, suggesting this may be a younger seep site compared to previously visited Concepción locations. Bubble activity confirmed ongoing fluid flow, and seep structures appeared to cluster along linear features.

Mapping:

This dive was guided by earlier acoustic mapping and CH₄ sensor data that suggested active bubbling at depth. The ROV confirmed those predictions, visually identifying venting sites and associated fauna. Although no new M3 mapping was conducted during the dive, its imagery helped validate and refine the acoustic interpretation of the seep field's spatial structure.

Operations:

A total of 47 samples were collected, including push cores, clam specimens, mats, and fluids. ROV operations required slow and deliberate movement around bubbling vents and rocky platforms to minimize disturbance. Pilots and scientists coordinated to capture high-quality imagery and select sampling targets in visually rich areas. The brooding octopus observation prompted a deliberate pause in sampling to allow for extended visual documentation. Navigation was aided by USBL tracking, and dive operations were executed efficiently with no major delays. The discovery of new seep features and high-value biological interactions made this dive one of the scientific highlights of the mid-expedition period.

Dive S0740 – Bio Bio Canyon (Detailed Summary)

Biological:

Dive S0740 surveyed a non-seep environment in the Bio Bio Canyon to establish baseline comparisons with seep-influenced sites. Biological communities were less dense than at seep locations but included a range of benthic organisms such as holothurians, brittle stars, sea pens, anemones, and scattered octocorals. Demersal fish, including rattails, were encountered cruising over soft sediments. Crabs and shrimp were observed along the base of rock outcrops and on sloping mud fans. Sessile filter feeders were sparsely distributed on boulders and hardground, with no chemosynthetic species recorded. The dive served to document faunal distribution in a deep, sediment-dominated canyon setting without active fluid flow.

Geological:

The dive transected down-slope across fine-grained sediment fans, interspersed with occasional boulder fields and exposed bedrock. Several mass-wasting features were observed, including scours, sediment slumps, and shallow gullies. Rock outcrops were more common near the upper slope and diminished with depth. No authigenic carbonates, bubble plumes, or venting structures were noted. The canyon morphology was consistent with downslope sediment transport and turbidity-driven processes, and the dive contributed to regional geological mapping of slope-to-abyss transitions.

Mapping:

The dive track followed contours derived from multibeam bathymetry acquired prior to the ROV deployment. No M3 sonar or other active mapping systems were used during the dive itself. The video collected during the dive helped to ground-truth acoustic backscatter interpretations, and provided context for classifying seafloor habitat types in the Bio Bio margin region.

Operations:

ROV operations were straightforward, with consistent altitude maintained over soft sediment terrain. A total of 27 samples were collected, including sediment push cores and faunal grabs. Sampling targeted representative substrates, including sediment flats, the bases of rock ledges, and sparse coral or sponge clusters. The ROV covered a wide spatial area using long, linear transects. Science and pilot teams coordinated to adjust tracklines based on visual interest, and no significant technical issues were reported. The dive succeeded in building out comparative datasets for future canyon vs. seep habitat analyses.

Dive S0741 – Bio Bio Canyon (South Wall – Detailed Summary)

Biological:

This dive targeted the steep southern wall of Bio Bio Canyon, revealing vertical habitat zonation and rich faunal assemblages concentrated along ledges and rocky outcrops. Dominant organisms included dense fields of sponges, large actinarians, octocorals, and branching soft corals. Crabs and brittle stars were common along narrow terraces and sediment-filled notches. Multiple fish species—including rattails, rockfish, and zoarcids—moved between crevices and hovered midwater along the wall. A highlight of the dive was the observation of a crab preying on a small fish, captured live on video. Faunal abundance and diversity were clearly enhanced in areas with higher relief and exposed hard substrate.

Geological:

The dive spanned a near-vertical canyon wall with alternating bedded sedimentary strata, fractured ledges, and debris fans. Mass wasting features such as talus slopes and slide scars were observed at depth. The topography was extremely rugged, with some vertical faces over 10 m tall. Hardground exposures dominated the upper wall, while mid- and lower sections included mixed sediment accumulations. No chemosynthetic features or authigenic carbonates were noted, reinforcing the classification of the site as a non-seep canyon habitat.

Mapping:

Pre-dive multibeam data and slope models informed dive planning, with the ROV track designed to trace vertical relief. No M3 sonar or active mapping systems were deployed during the dive, but high-definition video captured the structural complexity of the canyon wall. These data are valuable for habitat classification and 3D modeling of steep terrain.

Operations:

Dive S0741 posed navigational challenges due to vertical terrain, requiring precise piloting and careful vehicle orientation. Despite these constraints, 63 samples were collected, including faunal grabs, sponge and coral specimens, and sediment cores from flatter ledge zones. The ROV made multiple vertical ascents and descents along the wall to optimize sampling and visual coverage. Lighting was adjusted frequently to account for steep angles and overhangs. Coordination between science, pilots, and camera operators was essential to maximize observational data without compromising vehicle safety. The dive succeeded in characterizing one of the most complex vertical canyon habitats surveyed during the cruise.

Dive S0742 – Concepción Seep Site IV (South) – Detailed Summary

Biological:

Dive S0742 explored a new seep site identified from Klauke et al. (2012) acoustic data, confirming active seepage and vibrant faunal communities. The dive encountered extensive tubeworm thickets, clam patches, thick microbial mats, and mixed coral-bryozoan colonies. A notable sighting included a large chimera swimming near a carbonate ridge. Nudibranchs, shrimp, and amphipods were seen near bacterial mats, while squat lobsters and galatheid crabs clustered on rock surfaces. Anemones and sponges colonized vertical walls and carbonate faces. Multiple octopuses were documented among rock ledges. The diversity and density of organisms confirmed this as an active and mature seep environment.

Geological:

The site included sharp-sided mounds, carbonate-encrusted ridges, and steep escarpments, with clear signs of fluid discharge from cracks and fissures. Authigenic carbonate crusts and rubble piles were widespread, and soft sediment flanks showed signs of bioturbation. One of the most striking geological features was a vertically layered rock face colonized by mats and fauna—interpreted as a faulted carbonate structure exposing older seep deposits. Black bacterial mats were found along slope breaks and rock bases, indicating zones of high methane flux.

Mapping:

This dive capitalized on earlier CH₄ sensor and multibeam survey data, targeting a previously unmapped but acoustically anomalous mound. No new sonar mapping occurred during the dive itself. The ROV observations provided critical ground-truth for extending the known extent of seepage along the southern Concepción margin. These visual data will be incorporated into regional seep distribution models.

Operations:

A total of 61 samples were collected, including push cores, faunal specimens, microbial mats, and carbonate chips. The ROV maintained low, controlled altitude to allow imaging of steep and irregular terrain. Camera operators captured wide passes and macro views of target organisms. Pilots executed careful lateral and vertical adjustments around carbonate walls to allow safe sampling. Coordination among the pilots, navigator, and science team allowed for full spatial and biological coverage of the new site. This dive significantly expanded the mapped footprint of active seep systems in the area and introduced new faunal and geologic variation to the expedition's catalog.

Dive S0743 – Bio Bio Canyon (Deep Site – Detailed Summary)

Biological:

Dive S0743 extended canyon exploration to over 2050 m depth, revealing sparse but ecologically significant deep-sea fauna. Observed organisms included large holothurians, sea pens, brittle stars, solitary octocorals, and a Chilean dancer nudibranch (*Hexabranhus sanguineus*)—a rare and striking highlight. Several tubeworm bushes and sponge patches were found on the flanks of deeper sediment ridges. Mobile fauna included small benthic fish and shrimp, while anemones and crinoids occupied raised substrates. Bioturbation traces and scattered burrows were seen in soft sediment areas. Faunal density was low compared to shallower seeps or canyon walls, but key taxa indicative of deep benthic ecosystems were well represented.

Geological:

The dive traversed a deep segment of the Bio Bio Canyon characterized by soft sediment slopes, consolidated ridges, and sporadic rock outcrops. Ripples, fine-grained turbidite layers, and minor slumping features reflected sediment deposition and downslope transport. Some ledges showed signs of ancient mass wasting, with angular boulders and slope breaks. No chemosynthetic indicators or authigenic carbonates were detected, confirming the site as a non-seep deep canyon floor. The dive contributed important data on geological continuity from canyon axis to abyssal plain.

Mapping:

The dive followed pre-planned multibeam contours and targeted a deep axial transect. No active sonar mapping occurred during the dive, but ROV visual data provided crucial validation of geomorphological interpretations from acoustic maps. Observations of slope angles, sediment textures, and seafloor structures will be incorporated into canyon evolution and habitat classification studies.

Operations:

The ROV conducted extended linear transects along the deep canyon axis and sloped flanks. A total of 75 samples were collected, including push cores, sediment surface grabs, and faunal specimens. Navigational accuracy was essential to maintain straight paths and cover intended depth gradients. Science team observations helped prioritize sample locations in areas with visible fauna or sediment variation. Lighting adjustments and altitude changes were used to compensate for low-light conditions and maintain visual clarity. This dive effectively characterized one of the deepest non-seep habitats of the cruise, offering a valuable comparative framework for deep-sea biodiversity and geology.

Dive S0744 – Mocha Island Seeps (Deep Seeps – Detailed Summary)

Biological:

Dive S0744 was the first ROV investigation of deep methane seepage off Mocha Island. The site was teeming with chemosynthetic fauna, including extensive *Lamellibrachia* tubeworm fields, white and orange microbial mats, clam beds, and thick swarms of amphipods. Brittle stars and galatheid crabs were common on and around carbonate platforms. Several demersal fish species—including rattails and zoarcids—were present near bubbling sediments and among tubeworm colonies. Anemones, sponges, and sea cucumbers occupied the peripheries of seep zones. The distribution of fauna clearly followed zones of gas release, carbonate exposure, and sediment texture. Faunal density and diversity increased near hydrate patches and bubble streams.

Geological:

The seafloor was composed of authigenic carbonates, hydrate-encrusted mounds, soft sediment slopes, and pockmarked terrain. Several gas hydrate features were visually confirmed as bright, reflective patches with associated bubbling. Sediment layering and scattered boulder fields indicated a combination of seepage-related and slope-driven geological processes. Some hydrate was observed emerging directly from fractures in carbonate platforms. The terrain was moderately sloped and highly variable over small spatial scales.

Mapping:

This dive was designed to ground-truth sonar and gas detection data collected prior to the ROV deployment. Targets included known bubble plumes and acoustic anomalies. Although no new sonar data were acquired during the dive itself, the ROV confirmed several key gas-emission features and linked them to visible biological and geological expressions of seepage. The dive added visual evidence for Mocha Island as a major seep field.

Operations:

Sampling totaled 62 events and included push cores, microbial mats, clam and tubeworm grabs, and carbonate chips. Navigation required careful altitude control to avoid disturbing bubbling sediments and hydrate zones. The dive took place on Halloween, and science team dialogue included references to "ghostly bubble trails" and "seep candy mounds," adding levity to a highly productive mission. Pilots coordinated closely with the science team to optimize transects and target sampling around vent structures. The dive was a success in both scientific and operational terms, establishing Mocha Island as a key site for deep methane seep research.

Dive S0745 – Mocha Island Seeps (Deeper Seeps – Detailed Summary)

Biological:

Dive S0745 was the deepest of the expedition at over 2774 meters and revealed a unique biological community adapted to extreme depth and seepage. Amphipods were observed in dense swarms across sedimented mounds, including the striking “praying mantis” variety that hovered near bubble streams. White and orange microbial mats coated hydrate patches and cracks in the seafloor. Scattered clams were partially embedded in sediment, often oriented at odd angles likely due to gas seepage beneath them. Brittle stars, polychaetes, and a variety of small crustaceans occupied the seep periphery. Several benthic fish species were observed, including slow-moving rattails. No large sessile fauna like tubeworms or corals were documented, possibly due to the relatively young or unstable nature of the seep site.

Geological:

The seafloor displayed multiple gas hydrate outcrops, visibly shimmering and releasing bubbles. These hydrate patches were associated with fine sediment mounds, slope breaks, and occasional scattered carbonate crusts. Some vent zones were surrounded by circular depressions, potentially caused by repeated bubble emission or hydrate destabilization. No major rock outcrops or ledges were present. The terrain was sloped and gently undulating, with visible layering and fluidization in the sediment near active seep points.

Mapping:

This dive was guided by acoustic bubble plume detections collected by the M3 sonar and CH₄ sensors during previous mapping efforts. ROV operations were tightly aligned with these features, confirming that the bubbling sources coincided with hydrate and mat-rich seafloor structures. The dive did not generate new mapping data but was critical in verifying the accuracy of previous remote sensing.

Operations:

A total of 88 samples were collected, including push cores near hydrate patches, microbial mats, fauna, and gas-laden sediment. The ROV operated at extremely low altitude for most of the dive to preserve visibility and avoid disturbing delicate bubbling features. Pilots executed slow transects and maintained position for long periods to allow for methane sampling and hydrate visualization. The dive proceeded without incident, and the deep depth, unique fauna, and confirmed hydrate presence made it one of the most scientifically valuable dives of the cruise.

Dive S0746 – Mocha Island Seep Site II (Detailed Summary)

Biological:

Dive S0746 returned to a previously explored seep at Mocha Island to conduct expanded sampling and high-resolution visual surveys. Faunal highlights included large aggregations of clams (some in partially buried positions), Xenophyophores, translucent jellyfish (*Peralia* sp.), brittle stars, and amphipods. Several pelagic sea cucumbers were observed floating just above the seafloor, occasionally settling near bacterial mats. Microbial mat diversity was high, including both white and black mats in dense carpets over carbonate and sediment. A standout observation was the presence of orange, amorphous mat-like material of uncertain microbial composition. Crabs, shrimp, and anemones were also seen on rocky ledges and soft substrates. Overall, the dive revealed a complex and patchy distribution of seep fauna and mat types.

Geological:

The site was geologically varied, featuring carbonate ridges, pockmarked sediment plains, steep sediment hills, and exposed cracks with active seepage. Black mats appeared at the base of ridges, where fractures in the sediment revealed deeper fluid pathways. The northern edge of the site was bounded by angular rocks and sediment slides. Terrain heterogeneity created microhabitats that structured biological communities. Some ridges showed evidence of slumping or prior collapse. The black mats and orange microbial material corresponded closely with topographic breaks, suggesting strong links between fluid pathways and geologic structure.

Mapping:

No M3 or EM302 mapping was conducted during the dive, but its trackline was guided by CH₄ sensor data and the visual results of S0744. The dive extended spatial resolution of the site, refining the boundary of the active seep zone and identifying new subareas of venting and biological activity. High-resolution video was collected to supplement prior maps.

Operations:

Fifty-four samples were collected during this dive, including microbial mats, sediment cores, faunal specimens, and carbonate chips. The ROV operated primarily at low altitude to allow for close-up visual documentation of unique mat textures and fauna. Orange microbial features were prioritized for sampling and documentation. Navigation required careful coordination across carbonate ridges and over steep sediment mounds. The dive succeeded in expanding the known seep extent and introducing new biological and microbial targets of interest for further study.

Dive S0747 – Mocha Island Shallow Seep (Detailed Summary)

Biological:

Dive S0747 targeted a shallow methane seep site near Mocha Island, capping the expedition with a return to mid-depth environments. Faunal observations included scattered clams, brittle stars, shrimp, and polychaetes. Microbial mats were patchy but present, with several zones of white filamentous mats associated with small bubble streams. A number of amphipods and small fish were seen in the water column, along with a jellyfish drifting past the ROV near a bubbling mound. Faunal density was lower than at deeper Mocha seeps, but the presence of seep-indicator species confirmed active chemosynthetic influence.

Geological:

The terrain consisted of sedimented mounds, small carbonate-encrusted features, and localized bubble vents. Pockmark-like depressions marked areas of recent or ongoing gas escape. A few carbonate slabs and crusts were present, though more limited in extent compared to deeper seeps. The shallow depth allowed for clearer imaging and detailed views of sediment textures, including bioturbation traces and gas-influenced disturbances.

Mapping:

The dive was guided by previous CH₄ sensor and M3 sonar data that had identified bubble plumes in this region. No new sonar mapping was conducted during the dive, but visual confirmation of venting and associated habitat provided critical validation of acoustic targets. The shallow seep zone filled an important spatial gap in the expedition's seep system coverage.

Operations:

A total of 24 samples were collected, including microbial mats, push cores, and seep-associated fauna. The dive duration was relatively short but strategically designed to ground-truth key features seen in sonar data. ROV operations emphasized smooth transitions across sedimented terrain and close-up inspection of bubble vents. Lighting conditions were excellent at this depth, and the team obtained high-resolution imagery of faunal interactions and gas release. This dive concluded the expedition's ROV operations and provided a final data point in the seep system gradient from shallow to deep along the Chilean margin.

4. Data Inventory and Preliminary Results

Inventory of exploration activities

Operating region: **The** expedition spanned the Chilean margin, a tectonically complex and geologically dynamic region where the Nazca Plate subducts beneath the South American Plate. This subduction zone features diverse deep-sea environments, including methane seep fields, submarine canyons, and potentially hydrothermal vent systems, making it an ideal location for studying fluid migration and its impact on oceanic carbon cycling. The expedition focused on key seep sites along the continental margin, including the Limarí Seeps, El Quisco Seep Area, Concepción Methane Seep Area (CMSA), and Mocha Island Seep Area (MISA), covering a latitudinal range from approximately 30°S to 38°S.

These sites were chosen due to their known methane emissions, structural complexity, and accessibility for high-resolution mapping, coring, and ROV exploration. The region's combination of active faulting, seafloor fluid flow, and biological communities dependent on chemosynthetic processes provided a unique setting to investigate the geological and ecological interactions shaping deep-sea methane seep ecosystems.

Major equipment used:

- **High-Resolution Sub-Bottom Profiling:** Using the R/V *Falkor (too)* SBP29 system, we investigated the shallow subsurface structure of methane seepage. This state-of-the-art technology provided critical insights and informed the precise positioning of the coring device.
- **ROV SuBastian:** This robotic explorer enabled precise sampling and high-definition imaging of seep habitats, allowing us to observe active methane emissions and collect samples from microbial mats and methane-derived authigenic carbonates.
- **Geochemical Sensors and Samplers:** Deployed to analyze methane concentrations, sulfate gradients, and porewater chemistry, offering insights into seepage intensity and biogeochemical processes. This included the use of the in situ methane sensor, Sensing Aqueous Gases in the Environment (SAGE), which allowed for precise and real-time measurements of methane concentrations in the water column, enhancing our understanding of seep dynamics.
- **Gravity Coring:** The expedition marked the first deployment of a large-diameter, long coring device (up to 6 meters) off the R/V *Falkor (too)*. This technology allowed for the recovery of extended sedimentary records crucial for reconstructing methane seepage history.

5. Challenges

No challenges to report.

6. Highlights



Photo: PI Beeson and PI Oppo preparing the core barrel.

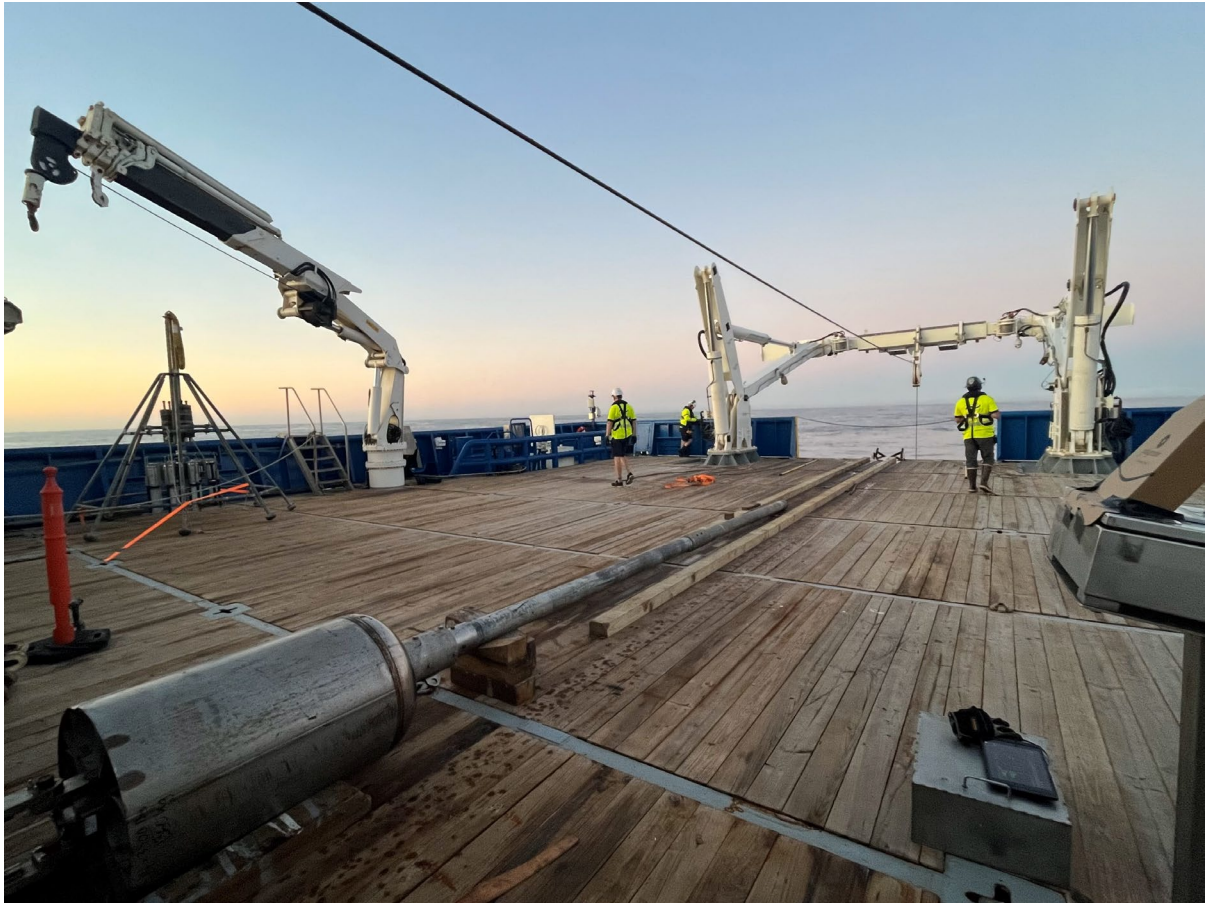


Photo: 6 meter gravity core stowed while deploying the 6 meter benthos corer.

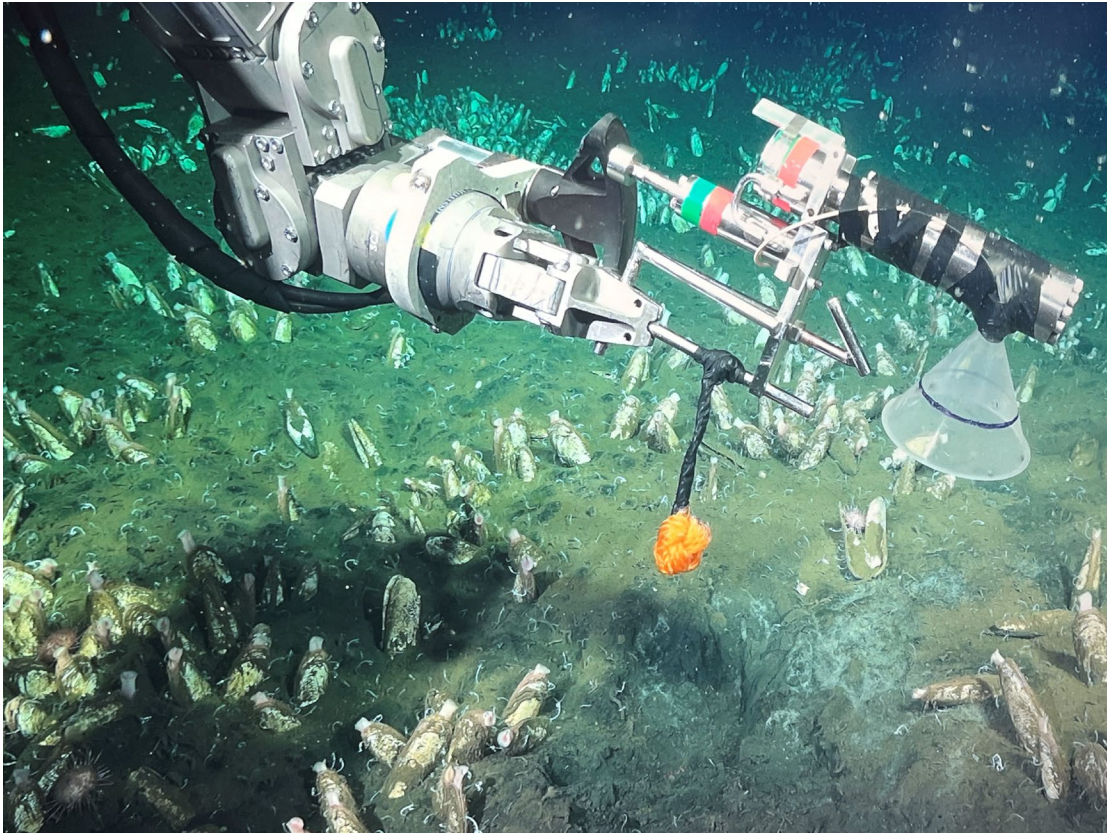


Photo: Gas Tight sample bottle collecting methane bubble emission sites.

7. Data management

Data Deliverables Summary

The FKt241011 expedition generated a wide array of scientific data products that will be archived and shared with various data repositories. These deliverables include bathymetric mapping data, sediment geochemistry, biological samples, genomic data, methane concentration analyses, ROV imagery and video, and mineralogical analyses. Each dataset has designated principal investigators responsible for its curation and submission to appropriate repositories such as NCEI, OBIS, BCO-DMO, PANGAEA, and WHOI.

Key deliverables include:

- **Multibeam sonar and sub-bottom profiling data** archived at **NCEI/MGDS**.
- **CTD and ADCP hydrographic data** submitted to **Rolling Deck to Repository (R2R)** to facilitate accessibility within the oceanographic community.
- Rock and sediment samples will be stored at the **Marine Geological Repository** at **Oregon State University**.
- High-resolution ROV imagery and videos are stored and available on the **Schmidt Ocean Institutes Youtube Channel**.

Data Management Plan

Data Collection and Documentation

- All data collected aboard the R/V *Falkor (too)* followed standardized protocols for acquisition, calibration, and metadata generation.
- Multibeam and sub-bottom sonar data were processed using industry-standard software and include metadata for accuracy and coverage.

Data Sharing and Public Access

- All datasets will be publicly available within **two years** of the expedition's completion (by December 2026).
- Datasets will be shared via **designated repositories** based on data type (e.g., NCEI for sonar data, OBIS for biological samples, NCBI for genomic sequences).
- Published data will be cited in peer-reviewed literature, ensuring discoverability and integration into future studies.

8. Education and outreach activities

The Schmidt Ocean Institute (SOI) managed all outreach activities for the FKt241011 expedition, ensuring that the public and scientific communities remained engaged with the discoveries made at sea. A key component of these efforts was the live streaming of ROV *SuBastian*'s dives, allowing audiences worldwide to witness deep-sea exploration in real-time via YouTube, Instagram, and other social media platforms. These broadcasts provided an unprecedented look at the diverse ecosystems, geological features, and hydrothermal activity encountered along the Chilean margin. In addition to daily updates, SOI released press materials, including a feature highlighting the expedition's findings on biodiversity and seafloor habitats (Press Release).

SOI also organized a series of ship-to-shore virtual engagements, where onboard scientists participated in live Q&A sessions with classrooms and educational groups around the world. These interactive discussions gave students direct access to the research team, providing insight into deep-sea exploration, oceanography, and marine geology. By fostering global engagement, the expedition helped inspire the next generation of ocean scientists while raising public awareness about deep-sea biodiversity and conservation.

9. Acknowledgments

The success of the FKt241011 expedition aboard the R/V *Falkor (too)* would not have been possible without the dedication and expertise of many individuals and organizations. We extend our deepest gratitude to the **captain and crew of the R/V Falkor (too)** for their tireless efforts in ensuring the safe and efficient execution of our scientific objectives. Their professionalism, technical skill, and support were instrumental in enabling our research in challenging deep-sea environments.

We gratefully acknowledge **NOAA Ocean Exploration** for funding this research and providing essential support for the mapping, sampling, and analysis of methane seep systems along the Chilean margin. The resources and expertise made available through NOAA Ocean Exploration were vital to the success of this mission.

We also sincerely thank the **Schmidt Ocean Institute** for providing the state-of-the-art research platform, R/V *Falkor (too)*, and the ROV *SuBastian*, which allowed us to conduct high-resolution mapping and sample collection. Their commitment to advancing ocean science and fostering international collaboration significantly enhanced our ability to explore and document these deep-sea environments.

A special acknowledgment is extended to our **Chilean colleagues and collaborators**, whose regional expertise, scientific insight, and logistical support were invaluable to the expedition. Their partnership strengthened our understanding of the complex geological and biological processes shaping methane seep ecosystems in this dynamic region.

Finally, we recognize the collective efforts of the entire scientific team, both onshore and at sea, whose dedication, teamwork, and passion for deep-sea exploration drove the success of this mission. The FKt241011 expedition stands as a testament to the power of collaboration in advancing our understanding of the deep ocean.

10. Sampling Tables

Deployment #	Recovery Method	Location	Timestamp (UTC)	Latitude (S)	Longitude (W)	USBL Depth (m)
1	Giant Gravity Corer	Control El Quisco	2024-10-15T20:53:04.790782Z	33°23.5191'	71°53.37782'	-376.258
2	Benthos Gravity Corer	Control El Quisco	2024-10-15T22:59:07.449145Z	33°23.51843'	71°53.37786'	-371.873
3	Giant Gravity Corer	El Quisco 1	2024-10-16T05:30:05.054519Z	33°22.82838'	71°53.44503'	-391.185
4	Giant Gravity Corer	El Quisco 1	2024-10-16T22:08:01.315486Z	33°22.84576'	71°53.39653'	-381.054
5	Benthos Gravity Corer	El Quisco 1	2024-10-16T23:51:15.239784Z	33°22.84246'	71°53.39664'	-383.543
6	MultiCorer	El Quisco 1	2024-10-17T01:35:32.474951Z	33°22.8453'	71°53.39609'	-410.606
7	Giant Gravity Corer	Control El Quisco	2024-10-17T03:06:46.048197Z	33°23.52007'	71°53.37739'	-374.751
8	Giant Gravity Corer	North El Quisco	2024-10-17T06:29:25.592172Z	33°22.27035'	71°53.64129'	-413.798
9	Giant Gravity Corer	CMSA Seep Faulted area	2024-10-24T00:30:27.512386Z	36°22.87627'	73°42.67554'	-658.669
10	Giant Gravity Corer	CMSA Seep Faulted area	2024-10-24T02:27:15.241135Z	36°22.81701'	73°43.04466'	-682.139
11	Benthos Gravity Corer	CMSA Seep Faulted area	2024-10-24T04:15:20.004905Z	36°22.81579'	73°43.03414'	-677.107
12	Giant Gravity Corer	CMSA Seep Faulted area	2024-10-24T06:05:33.453950Z	36°21.8385'	73°43.61093'	-832.721
13	Giant Gravity Corer	CMSA Seep Faulted area	2024-10-24T08:08:21.555256Z	36°23.29772'	73°42.17604'	-684.082
14	Giant Gravity Corer	CMSA Seep	2024-10-25T01:56:05.853768Z	36°22.86912'	73°42.68481'	-657.488

		Faulted area				
15	Benthos Gravity Corer	CMSA Seep Faulted area	2024-10-25T03:25:09.9309 48Z	36°22.86669'	73°42.68416'	-671.365
16	Giant Gravity Corer	CMSA Seep Faulted area	2024-10-25T04:56:07.7599 54Z	36°22.8718'	73°42.75559'	-668.762
17	Giant Gravity Corer	CMSA Seep Faulted area	2024-10-25T06:38:18.0035 60Z	36°22.53155'	73°43.5235'	-793.732
18	Benthos Gravity Corer	Mocha Island Control 2200m	2024-10-31T03:07:36.9671 75Z	38°27.70561'	74°09.26664'	-2225.179
19	Benthos Gravity Corer	Mocha Island Seep 2200m	2024-10-31T06:17:40.2321 15Z	38°28.87177'	74°08.89513'	-2172.016
20	Benthos Gravity Corer	Mocha Island Seep 2700m	2024-11-02T03:03:44.7206 28Z	38°28.11385'	74°15.30691'	-2748.367
21	Giant Gravity Corer	Mocha Island Seep 400m	2024-11-02T20:17:48.6361 18Z	38°31.04432'	73°59.93012'	-447.082
22	Giant Gravity Corer	Mocha Island Control 400m	2024-11-02T21:37:48.9655 85Z	38°30.86237'	73°59.88324'	-403.995

Table 1: Summary of coring deployments conducted during the cruise, including deployment number, recovery method, location, timestamp (UTC), GPS coordinates, and antenna height. Deployments were carried out using Giant Gravity Corers, Benthos Gravity Corers, and a MultiCorer across various sites, including El Quisco, CMSA Seep Faulted Area, and Mocha Island.

Core Name	Sample Name	Sample depth (cm)	Subsample (1,2,3,..)	Sample Size (mL)	Preservation Container	Preservation
FKt241011-10GC	FKt24-10GC-CH4-299cmPW	299	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-150cmPW	150	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-5cmPW	5	CH4	30	Glass Bottle	NaOH

FKt241011-10GC	FKt24-10GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-#63-160cmPW	160	63	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#64-160cmPW	160	64	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-160cmPW	160	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#65-210cmPW	210	65	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#66-210cmPW	210	66	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-210cmPW	210	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#67-260cmPW	260	67	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#68-260cmPW	260	68	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-260cmPW	260	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#95-10cmPW	10	95	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#96-10cmPW	10	96	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-10cmPW	10	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#97-60cmPW	60	97	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#98-60cmPW	60	98	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-60cmPW	60	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#99-110cmPW	110	99	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#100-110cmPW	110	100	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-110cmPW	110	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#1-309cmPW	309	1	1	2ml Eppendorf	ZnAcet

FKt241011-10GC	FKt24-10GC-#2-309cmPW	309	2	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-309cmPW	309	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#3-359cmPW	359	3	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#4-359cmPW	359	4	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-359cmPW	359	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-#5-439cmPW	439	5	1	2ml Eppendorf	ZnAcet
FKt241011-10GC	FKt24-10GC-#6-439cmPW	439	6	1	2ml Eppendorf	
FKt241011-10GC	FKt24-10GC-SYR-439cmPW	439	SYR	20	Syringe	
FKt241011-10GC	FKt24-10GC-CH4-439cmPW	439	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-110cmPW	110	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-309cmPW	309	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-10cmPW	10	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-210cmPW	210	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-160cmPW	160	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-359cmPW	359	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-409cmPW	409	CH4	30	Glass Bottle	NaOH
FKt241011-10GC	FKt24-10GC-CH4-260cmPW	260	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-393cmPW	393	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-93cmPW	93	CH4	30	Glass Bottle	NaOH

FKt241011-12GC	FKt24-12GC-CH4-243cmPW	243	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-#77-30cmPW	30	77	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#78-30cmPW	30	78	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-30cmPW	30	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#79-70cmPW	70	79	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#80-70cmPW	70	80	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-70cmPW	70	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#81-123cmPW	123	81	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#82-123cmPW	123	82	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-123cmPW	123	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#83-173cmPW	173	83	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#84-173cmPW	173	84	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-173cmPW	173	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#85-223cmPW	223	85	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#86-223cmPW	223	86	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-223cmPW	223	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#87-235cmPW	235	87	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#88-235cmPW	235	88	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-235cmPW	235	SYR	20	Syringe	

FKt241011-12GC	FKt24-12GC-#89-263cmPW	263	89	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#90-263cmPW	263	90	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-263cmPW	263	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#91-363cmPW	363	91	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#92-363cmPW	363	92	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-363cmPW	363	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-#93-383cmPW	383	93	1	2ml Eppendorf	ZnAcet
FKt241011-12GC	FKt24-12GC-#94-383cmPW	383	94	1	2ml Eppendorf	
FKt241011-12GC	FKt24-12GC-SYR-383cmPW	383	SYR	20	Syringe	
FKt241011-12GC	FKt24-12GC-CH4-123cmPW	123	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-383cmPW	383	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-223cmPW	223	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-243cmPW	243	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-363cmPW	363	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-263cmPW	263	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-173cmPW	173	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-30cmPW	30	CH4	30	Glass Bottle	NaOH
FKt241011-12GC	FKt24-12GC-CH4-70cmPW	70	CH4	30	Glass Bottle	NaOH

FKt241011-12GC	FKt24-12GC-CH4-235cmPW	235	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-CH4-239cmPW	239	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-CH4-89cmPW	89	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-#69-30cmPW	30	69	1	2ml Eppendorf	ZnAcet
FKt241011-13GC	FKt24-13GC-#70-30cmPW	30	70	1	2ml Eppendorf	
FKt241011-13GC	FKt24-13GC-SYR-30cmPW	30	SYR	20	Syringe	
FKt241011-13GC	FKt24-13GC-#71-80cmPW	80	71	1	2ml Eppendorf	ZnAcet
FKt241011-13GC	FKt24-13GC-#72-80cmPW	80	72	1	2ml Eppendorf	
FKt241011-13GC	FKt24-13GC-SYR-80cmPW	80	SYR	20	Syringe	
FKt241011-13GC	FKt24-13GC-#73-130cmPW	130	73	1	2ml Eppendorf	ZnAcet
FKt241011-13GC	FKt24-13GC-#74-130cmPW	130	74	1	2ml Eppendorf	
FKt241011-13GC	FKt24-13GC-SYR-130cmPW	130	SYR	20	Syringe	
FKt241011-13GC	FKt24-13GC-#75-230cmPW	230	75	1	2ml Eppendorf	ZnAcet
FKt241011-13GC	FKt24-13GC-#76-230cmPW	230	76	1	2ml Eppendorf	
FKt241011-13GC	FKt24-13GC-SYR-230cmPW	230	SYR	20	Syringe	
FKt241011-13GC	FKt24-13GC-CH4-30cmPW	30	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-CH4-80cmPW	80	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-CH4-130cmPW	130	CH4	30	Glass Bottle	NaOH
FKt241011-13GC	FKt24-13GC-CH4-230cmPW	230	CH4	30	Glass Bottle	NaOH

FKt241011-14GC	FKt24-14GC-CH4-243cmPW	243	CH4	30	Glass Bottle	NaOH
FKt241011-14GC	FKt24-14GC-CH4-90cmPW	90	CH4	30	Glass Bottle	NaOH
FKt241011-14GC	FKt24-14GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-14GC	FKt24-14GC-#26-60cmPW	60	26	1	2ml Eppendorf	ZnAcet
FKt241011-14GC	FKt24-14GC-#27-60cmPW	60	27	1	2ml Eppendorf	
FKt241011-14GC	FKt24-14GC-SYR-60cmPW	60	SYR	20	Syringe	
FKt241011-14GC	FKt24-14GC-#28-210cmPW	210	28	1	2ml Eppendorf	ZnAcet
FKt241011-14GC	FKt24-14GC-#29-210cmPW	210	29	1	2ml Eppendorf	
FKt241011-14GC	FKt24-14GC-SYR-210cmPW	210	SYR	20	Syringe	
FKt241011-14GC	FKt24-14GC-#30-230cmPW	230	30	1	2ml Eppendorf	ZnAcet
FKt241011-14GC	FKt24-14GC-#31-230cmPW	230	31	1	2ml Eppendorf	
FKt241011-14GC	FKt24-14GC-SYR-230cmPW	230	SYR	20	Syringe	
FKt241011-14GC	FKt24-14GC-CH4-230cmPW	230	CH4	30	Glass Bottle	NaOH
FKt241011-14GC	FKt24-14GC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-14GC	FKt24-14GC-CH4-210cmPW	210	CH4	30	Glass Bottle	NaOH
FKt241011-15BGC	FKt24-15BGC-#32-18cmPW	18	32	1	2ml Eppendorf	ZnAcet
FKt241011-15BGC	FKt24-15BGC-#33-18cmPW	18	33	1	2ml Eppendorf	
FKt241011-15BGC	FKt24-15BGC-SYR-18cmPW	18	SYR	20	Syringe	
FKt241011-15BGC	FKt24-15BGC-#34-38cmPW	38	34	1	2ml Eppendorf	ZnAcet

FKt241011-15BGC	FKt24-15BGC-#35-38cmPW	38	35	1	2ml Eppendorf	
FKt241011-15BGC	FKt24-15BGC-SYR-38cmPW	38	SYR	20	Syringe	
FKt241011-15BGC	FKt24-15BGC-#36-78cmPW	78	36	1	2ml Eppendorf	ZnAcet
FKt241011-15BGC	FKt24-15BGC-#37-78cmPW	78	37	1	2ml Eppendorf	
FKt241011-15BGC	FKt24-15BGC-SYR-78cmPW	78	SYR	20	Syringe	
FKt241011-15BGC	FKt24-15BGC-#38-128cmPW	128	38	1	2ml Eppendorf	ZnAcet
FKt241011-15BGC	FKt24-15BGC-#39-178cmPW	178	39	1	2ml Eppendorf	ZnAcet
FKt241011-15BGC	FKt24-15BGC-CH4-18cmPW	18	CH4	30	Glass Bottle	NaOH
FKt241011-15BGC	FKt24-15BGC-CH4-38cmPW	38	CH4	30	Glass Bottle	NaOH
FKt241011-15BGC	FKt24-15BGC-CH4-78cmPW	78	CH4	30	Glass Bottle	NaOH
FKt241011-15BGC	FKt24-15BGC-CH4-128cmPW	128	CH4	30	Glass Bottle	NaOH
FKt241011-15BGC	FKt24-15BGC-CH4-178cmPW	178	CH4	30	Glass Bottle	NaOH
FKt241011-15BGC	FKt24-15BGC-CH4-126cmPW	126	CH4	30	Glass Bottle	NaOH
FKt241011-16GC	FKt24-16GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-16GC	FKt24-16GC-#21-20cmPW	20	21	1	2ml Eppendorf	ZnAcet
FKt241011-16GC	FKt24-16GC-#22-20cmPW	20	22	1	2ml Eppendorf	
FKt241011-16GC	FKt24-16GC-SYR-20cmPW	20	SYR	20	Syringe	
FKt241011-16GC	FKt24-16GC-#23-60cmPW	60	23	1	2ml Eppendorf	ZnAcet
FKt241011-16GC	FKt24-16GC-#24-60cmPW	60	24	1	2ml Eppendorf	
FKt241011-16GC	FKt24-16GC-SYR-60cmPW	60	SYR	20	Syringe	

FKt241011-16GC	FKt24-16GC-#25-110cmPW	110	25	1	2ml Eppendorf	ZnAcet
FKt241011-16GC	FKt24-16GC-CH4-20cmPW	20	CH4	30	Glass Bottle	NaOH
FKt241011-16GC	FKt24-16GC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-16GC	FKt24-16GC-CH4-110cmPW	110	CH4	30	Glass Bottle	NaOH
FKt241011-16GC	FKt24-16GC-CH4-149cmPW	149	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-279cmPW	279	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-129cmPW	129	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-#7-20cmPW	20	7	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#8-20cmPW	20	8	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-20cmPW	20	SYR	20	Syringe	
FKt241011-17GC	FKt24-17GC-#9-60cmPW	60	9	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#10-60cmPW	60	10	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-60cmPW	60	SYR	20	Syringe	
FKt241011-17GC	FKt24-17GC-#11-110cmPW	110	11	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#12-110cmPW	110	12	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-110cmPW	110	SYR	20	Syringe	
FKt241011-17GC	FKt24-17GC-#13-160cmPW	160	13	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#14-160cmPW	160	14	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-160cmPW	160	SYR	20	Syringe	

FKt241011-17GC	FKt24-17GC-#15-210cmPW	210	15	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#16-210cmPW	210	16	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-210cmPW	210	SYR	20	Syringe	
FKt241011-17GC	FKt24-17GC-#17-260cmPW	260	17	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#18-260cmPW	260	18	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-260cmPW	260	SYR	20	Syringe	
FKt241011-17GC	FKt24-17GC-#19-290cmPW	290	19	1	2ml Eppendorf	ZnAcet
FKt241011-17GC	FKt24-17GC-#20-290cmPW	290	20	1	2ml Eppendorf	
FKt241011-17GC	FKt24-17GC-SYR-290cmPW	290	SYR	20	Syringe	
FKt241011-17GC	FKt24-17GC-CH4-290cmPW	290	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-110cmPW	110	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-210cmPW	210	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-160cmPW	160	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-260cmPW	260	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-20cmPW	20	CH4	30	Glass Bottle	NaOH
FKt241011-17GC	FKt24-17GC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-18BGC	FKt24-18BGC-CH4-126cmPW	126	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-#1-10cmPW	10	1	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#2-10cmPW	10	2	1	2ml Eppendorf	ZnAcet

FKt241011-1GC	FKt24-1GC-#3-10cmPW	10	3	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-#4-10cmPW	10	4	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-10cmPW	10	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#5-60cmPW	60	5	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#6-60cmPW	60	6	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#7-60cmPW	60	7	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-#8-60cmPW	60	8	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-60cmPW	60	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#9-80cmPW	80	9	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#10-80cmPW	80	10	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#11-80cmPW	80	11	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-#12-80cmPW	80	12	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-80cmPW	80	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#13-130cmPW	130	13	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#14-130cmPW	130	14	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-130cmPW	130	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#15-180cmPW	180	15	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#16-180cmPW	180	16	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-180cmPW	180	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#17-231cmPW	231	17	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#18-231cmPW	231	18	1	2ml Eppendorf	

FKt241011-1GC	FKt24-1GC-SYR-231cmPW	231	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#19-281cmPW	281	19	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#20-281cmPW	281	20	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-281cmPW	281	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-#21-331cmPW	331	21	1	2ml Eppendorf	ZnAcet
FKt241011-1GC	FKt24-1GC-#22-331cmPW	331	22	1	2ml Eppendorf	
FKt241011-1GC	FKt24-1GC-SYR-331cmPW	331	SYR	20	Syringe	
FKt241011-1GC	FKt24-1GC-CH4-10cmPW	10	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-80cmPW	80	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-130cmPW	130	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-180cmPW	180	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-231cmPW	231	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-281cmPW	281	CH4	30	Glass Bottle	NaOH
FKt241011-1GC	FKt24-1GC-CH4-331cmPW	331	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-10cmPW	10	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-20cmPW	20	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-30cmPW	30	CH4	30	Glass Bottle	NaOH

FKt241011-20BGC	FKt24-20BGC-CH4-40cmPW	40	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-50cmPW	50	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-70cmPW	70	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-80cmPW	80	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-90cmPW	90	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-100cmPW	100	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-110cmPW	110	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-120cmPW	120	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-130cmPW	130	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-#40-10cmPW	10	40	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#41-10cmPW	10	41	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-10cmPW	10	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#42-20cmPW	20	42	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#43-20cmPW	20	43	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-20cmPW	20	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#44-30cmPW	30	44	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#45-30cmPW	30	45	1	2ml Eppendorf	

FKt241011-20BGC	FKt24-20BGC-SYR-30cmPW	30	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#46-40cmPW	40	46	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#47-40cmPW	40	47	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-40cmPW	40	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#48-50cmPW	50	48	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#49-50cmPW	50	49	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-50cmPW	50	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#50-60cmPW	60	50	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#51-60cmPW	60	51	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-60cmPW	60	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#52-70cmPW	70	52	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#53-70cmPW	70	53	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-70cmPW	70	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#54-80cmPW	80	54	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#55-80cmPW	80	55	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-80cmPW	80	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#56-90cmPW	90	56	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#57-90cmPW	90	57	1	2ml Eppendorf	

FKt241011-20BGC	FKt24-20BGC-SYR-90cmPW	90	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#58-100cmPW	100	58	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#59-100cmPW	100	59	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-100cmPW	100	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#60-110cmPW	110	60	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#61-110cmPW	110	61	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-110cmPW	110	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#62-120cmPW	120	62	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#63-120cmPW	120	63	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-120cmPW	120	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-#64-130cmPW	130	64	1	2ml Eppendorf	ZnAcet
FKt241011-20BGC	FKt24-20BGC-#65-130cmPW	130	65	1	2ml Eppendorf	
FKt241011-20BGC	FKt24-20BGC-SYR-130cmPW	130	SYR	20	Syringe	
FKt241011-20BGC	FKt24-20BGC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-20BGC	FKt24-20BGC-CH4-135cmPW	135	CH4	30	Glass Bottle	NaOH
FKt241011-3GC	FKt24-3GC-#23-17cmPW	17	23	1	2ml Eppendorf	ZnAcet
FKt241011-3GC	FKt24-3GC-#24-17cmPW	17	24	1	2ml Eppendorf	
FKt241011-3GC	FKt24-3GC-SYR-17cmPW	17	SYR	20	Syringe	
FKt241011-3GC	FKt24-3GC-#25-60cmPW	60	25	1	2ml Eppendorf	ZnAcet

FKt241011-3GC	FKt24-3GC-#26-60cmPW	60	26	1	2ml Eppendorf	
FKt241011-3GC	FKt24-3GC-SYR-60cmPW	60	SYR	20	Syringe	
FKt241011-3GC	FKt24-3GC-#27-110cmPW	110	27	1	2ml Eppendorf	ZnAcet
FKt241011-3GC	FKt24-3GC-#28-110cmPW	110	28	1	2ml Eppendorf	
FKt241011-3GC	FKt24-3GC-SYR-110cmPW	110	SYR	20	Syringe	
FKt241011-3GC	FKt24-3GC-#29-160cmPW	160	29	1	2ml Eppendorf	ZnAcet
FKt241011-3GC	FKt24-3GC-#30-160cmPW	160	30	1	2ml Eppendorf	
FKt241011-3GC	FKt24-3GC-SYR-160cmPW	160	SYR	20	Syringe	
FKt241011-3GC	FKt24-3GC-#31-210cmPW	210	31	1	2ml Eppendorf	ZnAcet
FKt241011-3GC	FKt24-3GC-#32-210cmPW	210	32	1	2ml Eppendorf	
FKt241011-3GC	FKt24-3GC-SYR-210cmPW	210	SYR	20	Syringe	
FKt241011-3GC	FKt24-3GC-#33-242cmPW	242	33	1	2ml Eppendorf	ZnAcet
FKt241011-3GC	FKt24-3GC-#34-242cmPW	242	34	1	2ml Eppendorf	
FKt241011-3GC	FKt24-3GC-SYR-242cmPW	242	SYR	20	Syringe	
FKt241011-3GC	FKt24-3GC-CH4-17cmPW	17	CH4	30	Glass Bottle	NaOH
FKt241011-3GC	FKt24-3GC-CH4-60cmPW	60	CH4	30	Glass Bottle	NaOH
FKt241011-3GC	FKt24-3GC-CH4-110cmPW	110	CH4	30	Glass Bottle	NaOH
FKt241011-3GC	FKt24-3GC-CH4-160cmPW	160	CH4	30	Glass Bottle	NaOH
FKt241011-3GC	FKt24-3GC-CH4-210cmPW	210	CH4	30	Glass Bottle	NaOH

FKt241011-3GC	FKt24-3GC-CH4-242cmPW	242	CH4	30	Glass Bottle	NaOH
FKt241011-4GC	FKt24-4GC-CH4-235cmPW	235	CH4	30	Serum Bottle	NaOH
FKt241011-4GC	FKt24-4GC-CH4-84cmPW	84	CH4	30	Serum Bottle	NaOH
FKt241011-4GC	FKt24-4GC-CH4-0cmPW	0	CH4	30	Serum Bottle	NaOH
FKt241011-6MC1	FKt24-6MC1-#35-0cmPW	0	35	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#36-0cmPW	0	36	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-0cmPW	0	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-#37-2cmPW	2	37	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#38-2cmPW	2	38	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-2cmPW	2	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-#39-4cmPW	4	39	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#40-4cmPW	4	40	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-4cmPW	4	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-#41-6cmPW	6	41	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#42-6cmPW	6	42	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-6cmPW	6	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-#43-8cmPW	8	43	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#44-8cmPW	8	44	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-8cmPW	8	SYR	20	Syringe	

FKt241011-6MC1	FKt24-6MC1-#45-10cmPW	10	45	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#46-10cmPW	10	46	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-10cmPW	10	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-#47-12cmPW	12	47	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#48-12cmPW	12	48	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-12cmPW	12	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-#49-14cmPW	14	49	1	2ml Eppendorf	ZnAcet
FKt241011-6MC1	FKt24-6MC1-#50-14cmPW	14	50	1	2ml Eppendorf	
FKt241011-6MC1	FKt24-6MC1-SYR-14cmPW	14	SYR	20	Syringe	
FKt241011-6MC1	FKt24-6MC1-CH4-2cmPW	2	CH4	30	Glass Bottle	NaOH
FKt241011-6MC1	FKt24-6MC1-CH4-4cmPW	4	CH4	30	Glass Bottle	NaOH
FKt241011-6MC1	FKt24-6MC1-CH4-6cmPW	6	CH4	30	Glass Bottle	NaOH
FKt241011-6MC1	FKt24-6MC1-CH4-8cmPW	8	CH4	30	Glass Bottle	NaOH
FKt241011-6MC1	FKt24-6MC1-CH4-10cmPW	10	CH4	30	Glass Bottle	NaOH
FKt241011-6MC1	FKt24-6MC1-CH4-12cmPW	12	CH4	30	Glass Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-261cmPW	261	CH4	30	Serum Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-110cmPW	110	CH4	30	Serum Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-0cmPW	0	CH4	30	Serum Bottle	NaOH
FKt241011-8GC	FKt24-8GC-#51-40cmPW	40	51	1	2ml Eppendorf	ZnAcet

FKt241011-8GC	FKt24-8GC-#52-40cmPW	40	52	1	2ml Eppendorf	
FKt241011-8GC	FKt24-8GC-SYR-40cmPW	40	SYR	20	Syringe	
FKt241011-8GC	FKt24-8GC-#53-90cmPW	90	53	1	2ml Eppendorf	ZnAcet
FKt241011-8GC	FKt24-8GC-#54-90cmPW	90	54	1	2ml Eppendorf	
FKt241011-8GC	FKt24-8GC-SYR-90cmPW	90	SYR	20	Syringe	
FKt241011-8GC	FKt24-8GC-#55-110cmPW	110	55	1	2ml Eppendorf	ZnAcet
FKt241011-8GC	FKt24-8GC-#56-110cmPW	110	56	1	2ml Eppendorf	
FKt241011-8GC	FKt24-8GC-SYR-110cmPW	110	SYR	20	Syringe	
FKt241011-8GC	FKt24-8GC-#57-158cmPW	158	57	1	2ml Eppendorf	ZnAcet
FKt241011-8GC	FKt24-8GC-#58-158cmPW	158	58	1	2ml Eppendorf	
FKt241011-8GC	FKt24-8GC-SYR-158cmPW	158	SYR	20	Syringe	
FKt241011-8GC	FKt24-8GC-#59-209cmPW	209	59	1	2ml Eppendorf	ZnAcet
FKt241011-8GC	FKt24-8GC-#60-209cmPW	209	60	1	2ml Eppendorf	
FKt241011-8GC	FKt24-8GC-SYR-209cmPW	209	SYR	20	Syringe	
FKt241011-8GC	FKt24-8GC-#61-239cmPW	239	61	1	2ml Eppendorf	ZnAcet
FKt241011-8GC	FKt24-8GC-#62-239cmPW	239	62	1	2ml Eppendorf	
FKt241011-8GC	FKt24-8GC-SYR-239cmPW	239	SYR	20	Syringe	
FKt241011-8GC	FKt24-8GC-CH4-40cmPW	40	CH4	30	Glass Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-90cmPW	90	CH4	30	Glass Bottle	NaOH

FKt241011-8GC	FKt24-8GC-CH4-110cmPW	110	CH4	30	Glass Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-158cmPW	158	CH4	30	Glass Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-209cmPW	209	CH4	30	Glass Bottle	NaOH
FKt241011-8GC	FKt24-8GC-CH4-239cmPW	239	CH4	30	Glass Bottle	NaOH
FKt241011-9GC	FKt24-9GC-CH4-102cmPW	102	CH4	30	Glass Bottle	NaOH
FKt241011-9GC	FKt24-9GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt242011-15GC	FKt24-15GC-CH4-188cmPW	188	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-#66-10cmPW	10	66	1	2ml Eppendorf	ZnAcet
FKt241011-21GC	FKt24-21GC-#67-10cmPW	10	67	1	2ml Eppendorf	
FKt241011-21GC	FKt24-21GC-#68-60cmPW	60	68	1	2ml Eppendorf	ZnAcet
FKt241011-21GC	FKt24-21GC-#69-60cmPW	60	69	1	2ml Eppendorf	
FKt241011-21GC	FKt24-21GC-#70-110cmPW	110	70	1	2ml Eppendorf	ZnAcet
FKt241011-21GC	FKt24-21GC-#71-110cmPW	110	71	1	2ml Eppendorf	
FKt241011-21GC	FKt24-21GC-#72-140cmPW	140	72	1	2ml Eppendorf	ZnAcet
FKt241011-21GC	FKt24-21GC-#73-140cmPW	140	73	1	2ml Eppendorf	
FKt241011-22GC	FKt24-22GC-#74-204cmPW	204	74	1	2ml Eppendorf	ZnAcet
FKt241011-22GC	FKt24-22GC-#75-204cmPW	204	75	1	2ml Eppendorf	
FKt241011-22GC	FKt24-22GC-#76-263cmPW	263	76	1	2ml Eppendorf	ZnAcet
FKt241011-22GC	FKt24-22GC-#77-263cmPW	263	77	1	2ml Eppendorf	
FKt241011-22GC	FKt24-22GC-#78-313cmPW	313	78	1	2ml Eppendorf	ZnAcet

FKt241011-22GC	FKt24-22GC-#79-313cmPW	313	79	1	2ml Eppendorf	
FKt241011-22GC	FKt24-22GC-#80-340cmPW	340	80	1	2ml Eppendorf	ZnAcet
FKt241011-22GC	FKt24-22GC-#81-340cmPW	340	81	1	2ml Eppendorf	
FKt241011-22GC	FKt24-22GC-CH4-180cmPW	180	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-150cmPW	150	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-204cmPW	204	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-50cmPW	50	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-313cmPW	313	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-188cmPW	188	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-352cmPW	352	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-340cmPW	340	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-38cmPW	38	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-100cmPW	100	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-263cmPW	263	CH4	30	Glass Bottle	NaOH
FKt241011-22GC	FKt24-22GC-CH4-10cmPW	10	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-0cmPW	0	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-349cmPW	349	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-15cmPW	15	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-50cmPW	50	CH4	30	Glass Bottle	NaOH

FKt241011-21GC	FKt24-21GC-CH4-399cmPW	399	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-100cmPW	100	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-449cmPW	449	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-180cmPW	180	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-200cmPW	200	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-250cmPW	250	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-300cmPW	300	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-320cmPW	320	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-150cmPW	150	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-479cmPW	479	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-490cmPW	490	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-38cmPW	38	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-339cmPW	339	CH4	30	Glass Bottle	NaOH
FKt241011-21GC	FKt24-21GC-CH4-189cmPW	189	CH4	30	Glass Bottle	NaOH

Table 2: Fluid samples collected from sediment cores.